

LITTON INDUSTRIES

Electronic Display Laboratory, 1476 Sixty-sixth Street
Emeryville, California • Telephone OLympic 8-3831

CHROMATRON®

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TYPE PDF 10-1X

DEVELOPMENT TUBE: MODEL PDF 10-1X

SINGLE-GUN COLOR TUBE
ROUND METAL SHELL
ALUMINIZED SCREEN
TWO-COLOR PERSISTENT PHOSPHORS
ACTIVE SCREEN AREA OVER 6½" DIAMETER
SCREEN VOLTAGE UP TO 18,000 VOLTS

High resolution is afforded by phosphor strips of approximately 8 mils width on 12½ mil centers, or 80 color strips per inch. Sensitivity to external magnetic fields is low, and operation is not adversely affected by the earth's magnetic field due to changes in aircraft course or attitude. Simple circuitry is adequate for power supplies and color switching. Color convergence is inherent in the tube independent of circuit adjustment.

DESIGN ALTERNATES

Instead of P-25 orange and P-2 green, both long persistence phosphors, tubes can be furnished with P-25 orange and P-7 yellow-green. P-7 is a cascade type with blue backing, having a fast decay blue and long persistence yellow-green; both characteristics can be utilized, or either one can be filtered out by external filters. Other phosphors can be furnished on request.

Design modifications of the Litton Model PDF 10-1X Chromatron indicator can be produced on special order. Among the features which may be varied are: (1) number of phosphor lines per inch, (2) two-color or three-color screens of various persistence, (3) screen area, (4) envelope size, shape and length, (5) deflection: magnetic or electrostatic, (6) focus: magnetic or electrostatic.

APPLICATIONS

Suggested applications include: target identification, moving target identification (MTI), IFF, anti-jamming, navigational beacons, terrain clearance, plane elevation indicator, collision course indicator, etc.

DATA

GENERAL

| | |
|-------------------------------------|---------------|
| Heater voltage (AC or DC) | 6.3 volts |
| Heater current | 0.6 amperes |
| Direct Interelectrode Capacitances: | |
| Grid #1 to all other electrodes | 6 uuf |
| Cathode to all other electrodes | 5 uuf |
| Color selectors to each other | 1,200 uuf |
| Phosphors (long persistence) | P-25 orange |
| | P-2 green |
| Focusing Method | Magnetic |
| Color Selection Method | Electrostatic |
| Deflection Method | Magnetic |

| | |
|----------------------------|----------|
| Deflection Angle (Approx.) | 34° |
| Length | 20¾ in. |
| Weight | 11¼ lbs. |

*MAXIMUM RATINGS

| | | |
|---|------------|-----------------------|
| Screen (ultor) voltage (Note 1) | max. volts | 18,000 DC |
| Grid #3 voltage | | 8,000 DC |
| Grid #2 voltage | | 600 DC |
| Color selector voltage | | 400 peak |
| Color grid to phosphor plate | | 13,500 DC |
| Seeker voltage (Note 2) | | 350 DC |
| Grid #1 voltage: | | |
| Negative bias value | | 200 |
| Positive bias value | | 0 DC |
| Positive peak value | | 2 |
| Peak heater — cathode voltage: | | |
| Heater neg. with respect to cathode during equip. warm-up period not to exceed 15 seconds | | 410 DC |
| After equip. warm-up | | 180 DC |
| Heater pos. with respect to cathode | | 180 DC |
| | | *design-center values |

TYPICAL OPERATION

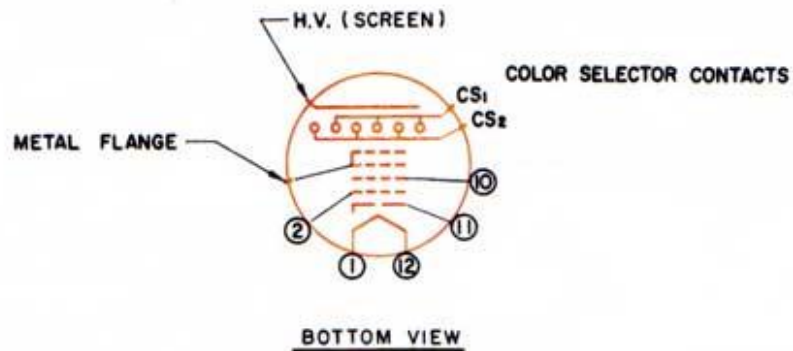
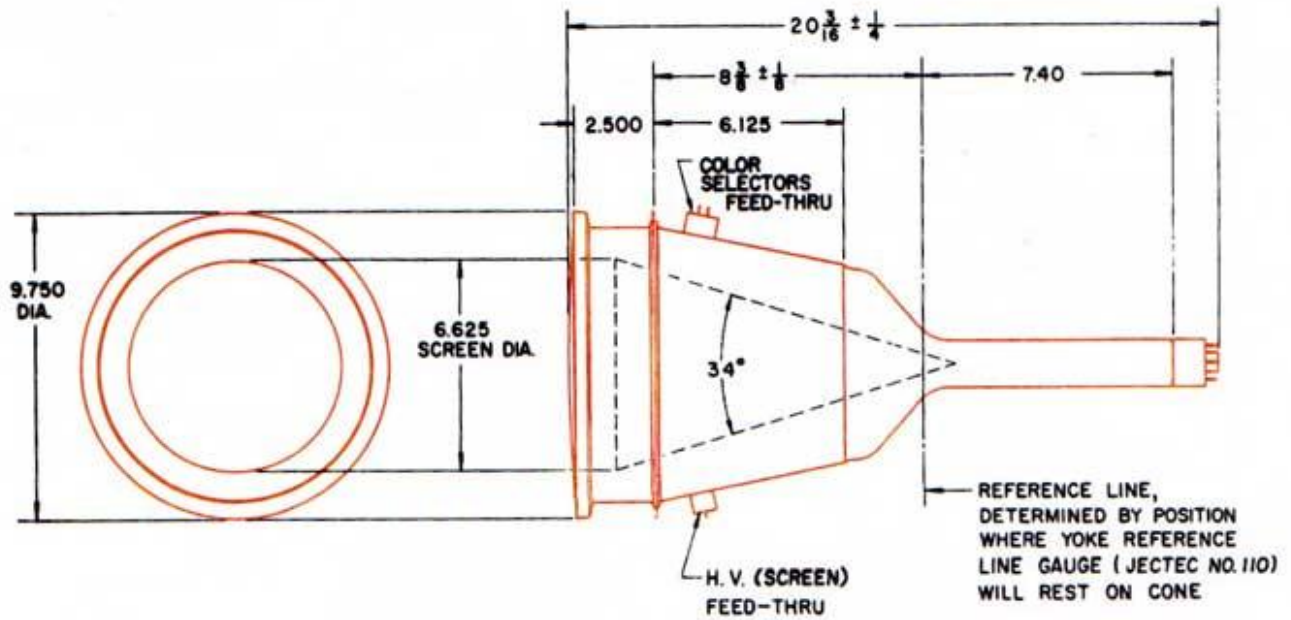
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|--------------------------------|-------------------|
| Screen (ultor) voltage | 16,000 DC |
| Grid #3 voltage (Note 3) | 3,500 to 5,500 DC |
| Color selector voltage | 200 peak |
| Seeker voltage | 100 to 300 DC |
| Grid #2 voltage | 300 DC |
| Grid #1 voltage (Note 4) | -50 to -105 DC |
| Focusing coil current (Note 5) | 60 to 80 ma DC |
| Circuit values: | |
| Grid #1 circuit resistance | 1.5 megs. max. |

NOTES

1. Screen (ultor) voltage is defined as the total accelerating DC potential between the cathode and the phosphor plate. This anode voltage provides the high potential necessary for the function of post-deflection focusing.
2. Seeker voltage is defined as the DC potential between the color selectors and Grid #3. This voltage is such that the color selectors are negative with respect to Grid #3, and is adjusted for optimum color purity.
3. Color purity is determined by the optimum ratio of the anode voltage to the Grid #3 voltage, seeker voltage, and focus coil positioning.
4. For visual extinction of focused spot.
5. With the JETEC focus coil #109 located so that the center of the focus coil gap is located four inches behind the yoke reference line.

CHROMATRON® TYPE PDF 10-1X

DIMENSIONAL OUTLINE



PIN 1 — HEATER
 PIN 2 — GRID NO. 1
 PIN 10 — GRID NO. 2
 CS₁, CS₂ — COLOR SELECTORS
 H.V. — HIGH VOLTAGE (SCREEN)

PIN 12 — HEATER
 PIN 11 — CATHODE
 FLANGE — GRID NO. 3

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TYPE PDF 10-2X

DEVELOPMENT TUBE: MODEL PDF 10-2X

SINGLE-GUN COLOR TUBE
ROUND METAL SHELL
TWO-COLOR PERSISTENT PHOSPHORS
PHOSPHORS ON RELATIVELY FLAT FACE
ALUMINIZED SCREEN
ACTIVE SCREEN AREA OVER 7½" DIAMETER
SCREEN VOLTAGE UP TO 18,000 VOLTS

High resolution is afforded by phosphor strips of approximately 8 mils width on 12½ mil centers, or 80 color strips per inch. Sensitivity to external magnetic fields is low, and operation is not adversely affected by the earth's magnetic field due to changes in aircraft course or attitude. Simple circuitry is adequate for power supplies and color switching. Color convergence is inherent in the tube, independent of circuit adjustment.

DESIGN ALTERNATES

Instead of P-25 orange and P-2 green, both long persistence phosphors, tubes can be furnished with P-25 orange and P-7 yellow-green. P-7 is a cascade type with blue backing having a fast decay blue and long persistence yellow-green; both characteristics can be utilized, or either one can be filtered out by external filters. Other phosphors can be furnished on request.

Design modifications of the Litton Model PDF 10-2X Chromatron indicator can be produced on special order. Among the features which may be varied are: (1) number of phosphor lines per inch, (2) two-color or three-color screens of various persistence, (3) screen area, (4) envelope size, shape and length, (5) deflection: magnetic or electrostatic, (6) focus: magnetic or electrostatic.

APPLICATIONS

Suggested applications include: target identification, moving target identification (MTI), IFF, anti-jamming, navigational beacons, terrain clearance, plane elevation indicator, collision course indicator, etc.

DATA

GENERAL

| | |
|-------------------------------------|--------------------------|
| Heater voltage (AC or DC) | 6.3 volts |
| Heater current | 0.6 amperes |
| Direct Interelectrode Capacitances: | |
| Grid #1 to all other electrodes | 6 uuf |
| Cathode to all other electrodes | 5 uuf |
| Color selectors to each other | 1,200 uuf |
| Phosphors (long persistence) | P-25 orange P-2 green |
| Focusing Method | Magnetic |
| Color Selector Method | Electrostatic |
| Deflection Method | Magnetic |

| | |
|----------------------------|---------|
| Deflection Angle (Approx.) | 34° |
| Length | 19¼ in. |
| Weight | 8½ lbs. |

*MAXIMUM RATINGS

| | |
|---|-----------------------|
| | max. volts |
| Screen (ultor) voltage (Note 1) | 18,000 DC |
| Grid #3 voltage | 8,000 DC |
| Grid #2 voltage | 600 DC |
| Color selector voltage | 400 peak |
| Color grid to phosphor plate | 13,500 DC |
| Seeker voltage (Note 2) | 350 DC |
| Grid #1 voltage: | |
| Negative bias value | 200 |
| Positive bias value | 0 DC |
| Positive peak value | 2 |
| Peak heater — cathode voltage: | |
| Heater neg. with respect to cathode during equip. warm-up period not to exceed 15 seconds | 410 DC |
| After equip. warm-up | 180 DC |
| Heater pos. with respect to cathode | 180 DC |
| | *design-center values |

TYPICAL OPERATION

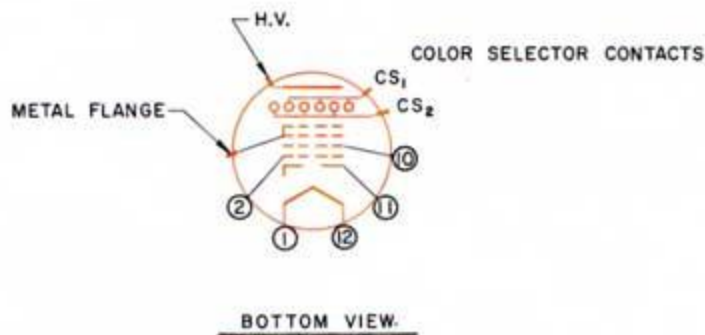
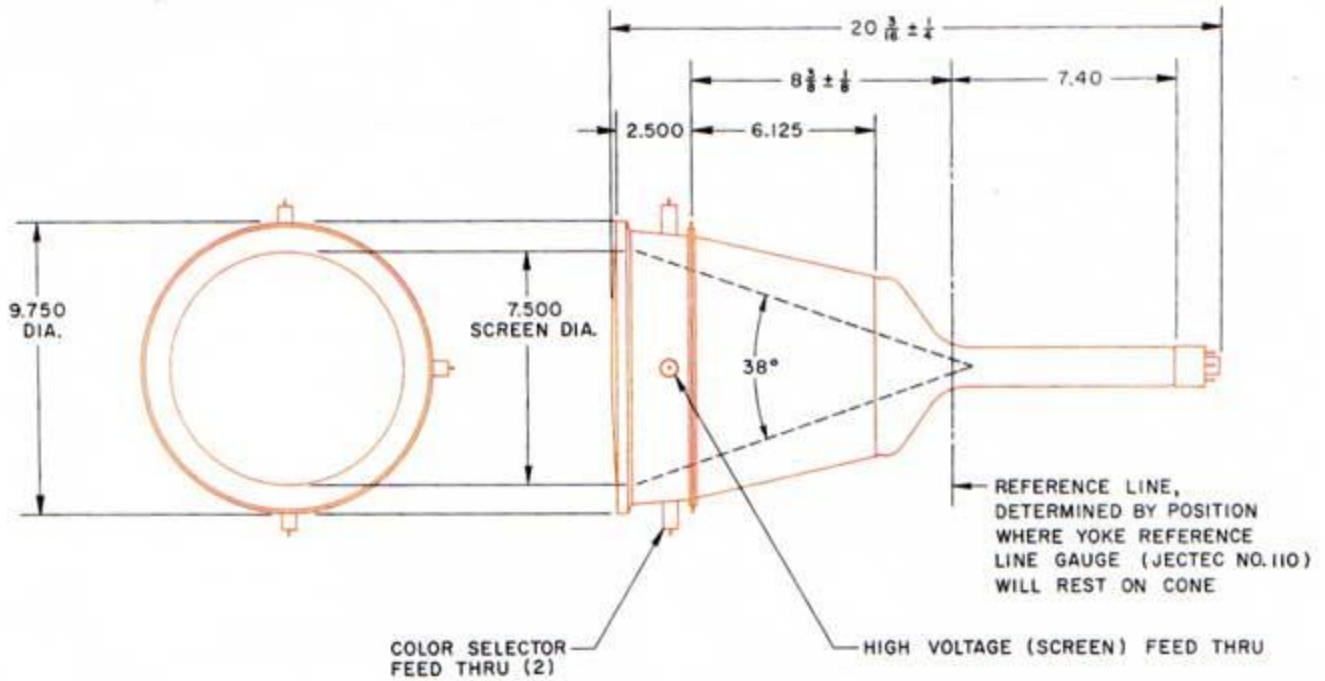
| | |
|--------------------------------|--------------------|
| Screen (ultor) voltage | 16,000 DC |
| Grid #3 voltage (Note 3) | 3,500 to 15,500 DC |
| Color selector voltage | 200 peak |
| Seeker voltage | 100 to 300 DC |
| Grid #2 voltage | 300 DC |
| Grid #1 voltage (Note 4) | -50 to -105 DC |
| Focusing coil current (Note 5) | 60 to 80 ma DC |
| Circuit values: | |
| Grid #1 circuit resistance | 1.5 megs. max. |

NOTES

- Screen (ultor) voltage is defined as the total accelerating DC potential between the cathode and the phosphor plate. This anode voltage provides the high potential necessary for the function of post-deflection focusing.
- Seeker voltage is defined as the DC potential between the color selectors and Grid #3. This voltage is such that the color selectors are negative with respect to Grid #3, and is adjusted for optimum color purity.
- Color purity is determined by the optimum ratio of the anode voltage to the Grid #3 voltage, seeker voltage, and focus coil positioning.
- For visual extinction of focused spot.
- With the JETEC focus coil #109 located so that the center of the focus coil gap is located four inches behind the yoke reference line.

CHROMATRON TYPE PDF 10-2X

DIMENSIONAL OUTLINE



PIN 1 — HEATER
 PIN 2 — GRID NO.1
 PIN 10 — GRID NO.2
 CS₁, CS₂ — COLOR SELECTORS
 H.V. — HIGH VOLTAGE (SCREEN)

PIN 12 — HEATER
 PIN 11 — CATHODE
 FLANGE — GRID NO.3

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TYPE PDF 12-2X

DEVELOPMENT TUBE: MODEL PDF 12-2X

SINGLE-GUN COLOR TUBE
ROUND METAL SHELL
THREE-COLOR PERSISTENT PHOSPHORS
PHOSPHORS ON RELATIVELY FLAT FACE
ALUMINIZED SCREEN
ACTIVE SCREEN AREA OVER 10" DIAMETER
SCREEN VOLTAGE UP TO 18,000 VOLTS

High resolution is afforded by phosphor strips of approximately 7.5 mils width on 8 mil centers, or 125 color strips per inch. Sensitivity to external magnetic fields is low. Simple circuitry is adequate for power supplies and color switching. Color convergence is inherent in the tube, independent of circuit adjustment.

DESIGN ALTERNATES

The normally furnished P-25 orange, P-2 green, and a specially developed blue (all long persistence phosphors which give a capability of blending colors to achieve distinct hues) may be replaced by other phosphors of various hue or persistence characteristics upon request.

Modified designs of the Litton developed CHROMATRON display tubes can be produced on special order. Among the features which may be varied are: (1) number of phosphor lines per inch, (2) two-color or three-color screens of various persistencies, (3) screen area, (4) envelope size, shape, and length, (5) deflection: magnetic or electrostatic, (6) focus: magnetic or electrostatic.

APPLICATIONS

Suggested applications include: target identification, moving target identification (MTI), IFF, anti-jamming, navigational beacons, terrain clearance, plane elevation indicator, collision course indicator, etc.

GENERAL

| | |
|-------------------------------------|----------------------|
| Heater voltage (AC or DC) | 6.3 volts |
| Heater current | 0.6 amperes |
| Direct Interelectrode Capacitances: | |
| Grid #1 to all other electrodes | 6 uuf |
| Cathode to all other electrodes | 5 uuf |
| Color selectors to each other | 1700 uuf |
| Phosphors (long persistence): | |
| Single color (31 strips/inch) | } P-25 orange, *blue |
| Double color (62 strips/inch) | |
| Focusing Method | Electrostatic |
| Color Selection Method | Electrostatic |
| Deflection Method | Magnetic |
| Deflection Angle (Approx.) | 55° |
| Length | 18 in. |
| Weight | 9¼ lbs. |

*Developmental

**MAXIMUM RATINGS

| | max. volts |
|---|------------------|
| Screen (ultor) voltage (Note 1) | 18,000 DC |
| Grid #3 voltage | 8,000 DC |
| Grid #2 voltage | 600 DC |
| Color selector voltage | 400 peak |
| Color grid to phosphor plate | 13,500 DC |
| Seeker voltage (Note 2) | 350 DC |
| Grid #1 voltage: | |
| Negative bias value | 180 |
| Positive bias value | 0 DC |
| Positive peak value | 0 |
| Focus electrode voltage | -500 to +1000 DC |
| Peak heater - cathode voltage: | |
| Heater neg. with respect to cathode | 180 DC |
| Heater pos. with respect to cathode | 180 DC |
| Twist coil current - milliamps (Note 3) | 200 DC |

**design-center values

TYPICAL OPERATION

| | |
|------------------------------|------------------|
| Screen (ultor) voltage | 15,000 DC |
| Grid #3 voltage (Note 4) | 4,000 DC |
| Color selector voltage | 265 peak |
| Seeker voltage | 100 to 300 DC |
| Grid #2 voltage | 300 DC |
| Grid #1 voltage (Note 5) | -28 to -72 DC |
| Focus electrode current | -15 to +15 DC |
| Focus electrode voltage | -500 to +1000 DC |
| Twist coil current-milliamps | 100 DC |
| Circuit values: | |
| Grid #1 circuit resistance | 1.5 megs. max. |

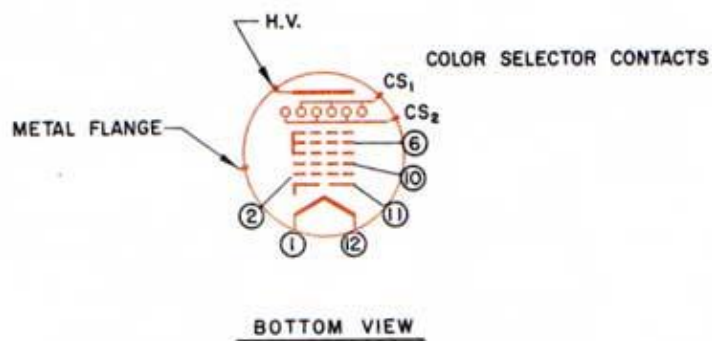
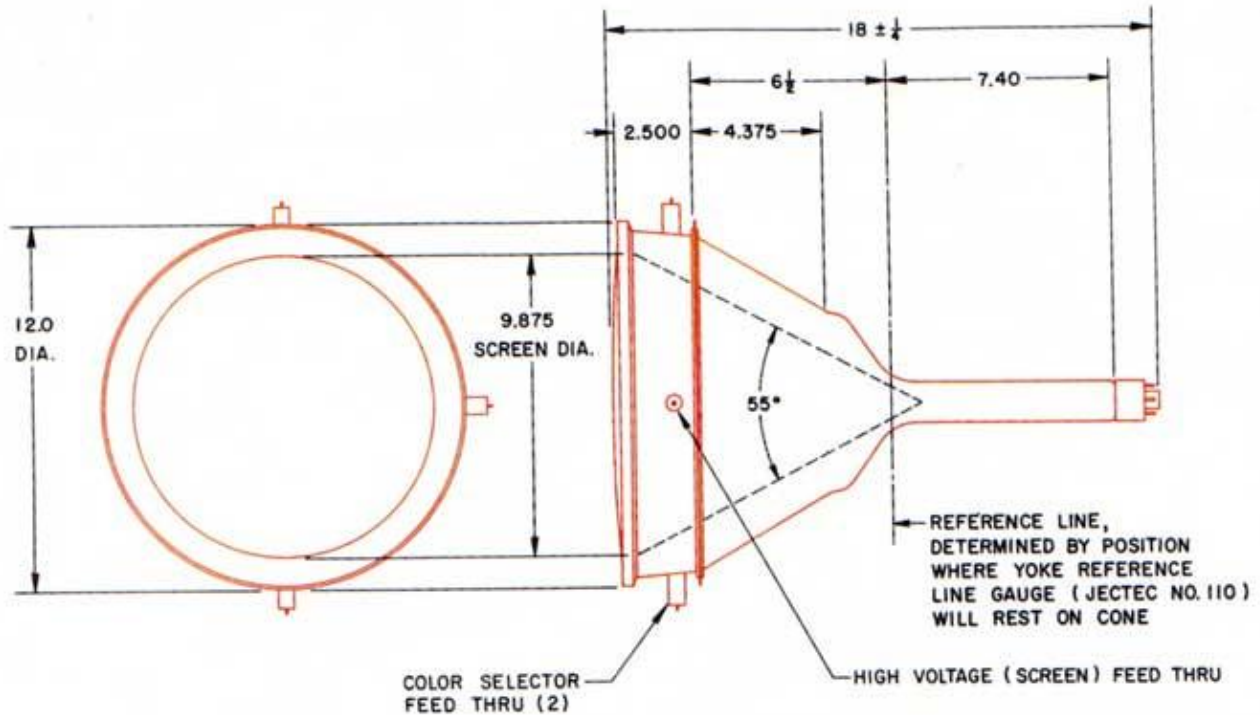
NOTES

- Screen (ultor) voltage is defined as the total accelerating DC potential between the cathode and the phosphor plate. This anode voltage provides the high potential necessary for the function of post-deflection focusing.
- Seeker voltage is defined as the DC potential between the color selectors and Grid #3. This voltage is such that the color selectors are negative with respect to Grid #3, and is adjusted for optimum color purity.
- Twist coil: a 13" ID coil composed of 100 turns of #26 copper wire, mounted peripherally around the viewing panel, coaxial with the tube, neutralizes earth's field effects.
- Color purity is determined by the optimum ratio of the anode voltage to the Grid #3 voltage, seeker voltage, and beam centering adjustment.
- For visual extinction of focused spot.

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CHROMATRON® TYPE PDF 12-2X

DIMENSIONAL OUTLINE



PIN 1 — HEATER
 PIN 2 — GRID NO. 1
 PIN 6 — FOCUS ELECTRODE
 PIN 10 — GRID NO. 2
 CS₁, CS₂ — COLOR SELECTORS
 H.V. — HIGH VOLTAGE (SCREEN)

PIN 12 — HEATER
 PIN 11 — CATHODE
 FLANGE — GRID NO. 3

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TYPE PDF 22-250A

DEVELOPMENT TUBE: MODEL PDF 22-250A

SINGLE-GUN PICTURE TUBE
RECTANGULAR GLASS SHELL
SHIELDED FOR RADIATION SUPPRESSION
LARGE, BRIGHT DISPLAY AT 25 KV OR LESS

The full 4:3 aspect ratio rectangular shape allows reproduction of the transmitted picture without waste of screen area, or sacrifice of transmitted information, and permits use of a cabinet having about 20 percent less height than is required for a round tube with equal width. The single-gun construction provides bright pictures without color fringing when displaying black and white or color pictures. Need for static and dynamic electrical and mechanical convergence equipment and adjustments is eliminated, greatly simplifying set design, tube installation and the adjustments for optimum performance.

Inherent tolerances of the tube permit auxiliary deflection to the rear of the primary deflection yoke, which may be used for character or symbol formation without adverse effect on color purity. Additional information on deflection components for this application will be furnished on request.

DESIGN ALTERNATES

Instead of the P-22 color television phosphors, long persistence phosphors, or a combination of short and long persistence phosphors may be utilized. Design modifications of the Litton Model PDF 22-250A CHROMATRON color tube, which can be produced on special order, include 2-color or 3-color screens, and either magnetic or electrostatic focus.

GENERAL

| | |
|-------------------------------------|-----------------------|
| Heater voltage (AC or DC) | 6.3 volts |
| Heater current | 0.6 amperes |
| Direct Interelectrode Capacitances: | |
| Grid #1 to all other electrodes | 6 uuf |
| Cathode to all other electrodes | 5 uuf |
| Color selectors to each other | 2700 uuf |
| Color selectors to all other | 900 uuf |
| Phosphors | P-22 Blue, Green, Red |
| Focusing method | Magnetic |
| Color selection method | Electrostatic |
| Deflection method | Magnetic |
| Deflection angles (approx.) | |
| Diagonal | 71° |
| Horizontal | 70° |
| Vertical | 56° |

RATINGS (DESIGN CENTER VALUES)

| | max. volts |
|---|------------|
| Screen (ultor) voltage (Note 1) | 25,000 DC |
| Grid #3 voltage | 8,000 DC |
| Grid #2 voltage | 1,000 DC |
| Color selector voltage, CS1-CS2 | 600 peak |
| Color selector grid to screen | 20,000 DC |
| Seeker voltage (Note 2) | 400 DC |
| Grid #1 voltage: | |
| Negative bias value | 125 |
| Positive bias value | 0 |
| Positive peak value | 2 |
| Peak heater — cathode voltage | |
| Heater neg. with respect to cathode during equip. warm-up period not to exceed 15 seconds | 410 DC |
| After equip. warm-up | 180 DC |
| Heater pos. with respect to cathode | 180 DC |

TYPICAL OPERATION

| | |
|---------------------------------|----------------|
| Screen voltage | 25,000 DC |
| Grid #3 voltage (Note 3) | 6,700-7,500 DC |
| Color selector voltage, CS1-CS2 | 260 rms |
| Seeker voltage | 100-300 DC |
| Grid #2 voltage | 350 DC |
| Grid #1 voltage (Note 4) | -50 to -105 DC |
| Focusing coil current (Note 5) | 58 to 74 DC |
| Circuit values: | |
| Grid #1 circuit resistance | 1.5 megs. max. |

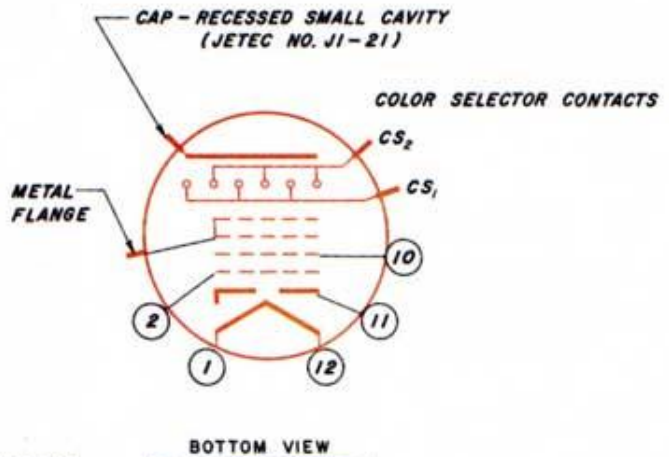
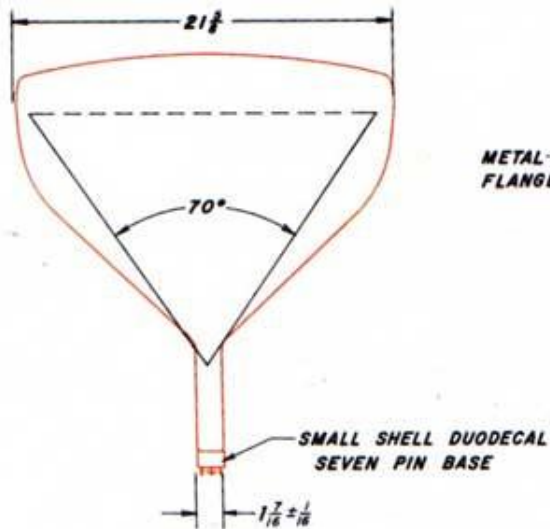
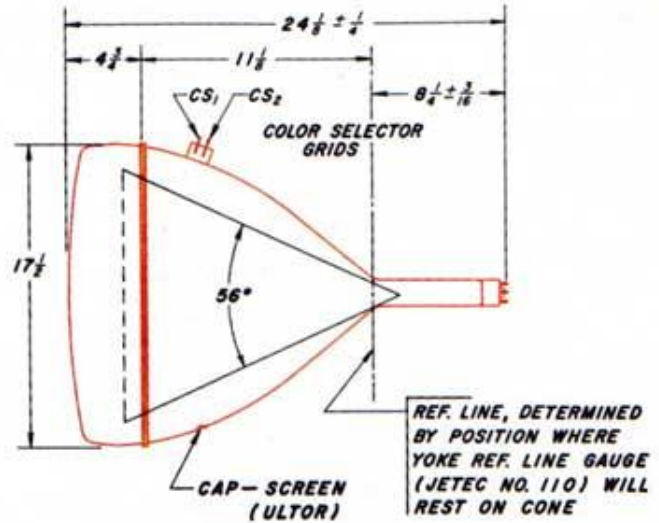
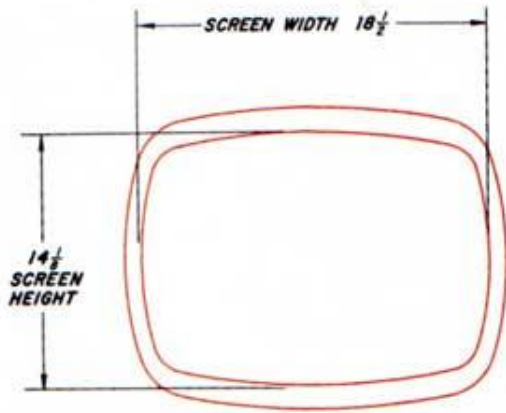
NOTES

1. Screen (ultor) voltage is defined as the total accelerating DC potential between the cathode and the phosphor plate. This screen voltage also provides a high potential for the function of post deflection focusing (PDF).
2. Seeker voltage is the DC potential making the color selectors negative with respect to grid #3, and is used as a color purity adjustment.
3. Color purity is determined primarily by the correct ratio of screen voltage to grid #3 voltage. The final seeker voltage adjustment as in Note 2 above; the tilt of the focus coil with respect to the tube axis, and twist coil current (ref. operational instructions), are also factors. For switched fields (normally red and blue), the proper setting of color selector voltage provides color purity.
4. For visual extinction of focused spot.
5. With JETEC focus coil #109 located so that the center of the focus coil gap is three inches behind the yoke reference line.

CHROMATRON® TYPE PDF 22-250A

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DIMENSIONAL OUTLINE



- | | |
|--|---------------------|
| PIN 1 - HEATER | PIN-12 - HEATER |
| PIN 2 - GRID NO. 1 | PIN 11 - CATHODE |
| PIN 10 - GRID NO. 2 | FLANGE - GRID NO. 3 |
| CS ₁ , CS ₂ - COLOR SELECTOR GRIDS | |
| CAP - SCREEN (ULTOR) | |